# EXHIBIT 5

Declaration of Andrew Barclay

I declare under penalty of perjury under the laws of the United States of America that the following is true and correct.

1. My name is Andrew Barclay. I prepared a report dated June 9, 2011 in response to Mr. John Goad's report titled "REVIEW OF THE RESPONSE BY THE OKLAHOMA DEPARTMENT OF HUMAN SERVICES TO THE SUSPECTED ABUSE AND NEGLECT OF CHILDREN IN ITS CARE" dated March 15, 2011. As I mentioned in my report, I reviewed Mr. Goad's considered materials and I found that Mr. Goad was supplied with a list of children involved in 420 investigated referrals during calendar year 2009. The 420 referrals were to be the universe of investigated referrals for Mr. Goad's review. In Mr. Goad's March 15, 2011 report he stated throughout his report that he had 343 referrals in his universe of investigated referrals. (Dkt. 636-3) Thus, 420-343=77 referrals were missing from Mr. Goad's universe of investigated referrals. With no explanation of this discrepancy in Mr. Goad's report or considered materials, I concluded that Mr. Goad's sample was not representative of his universe of investigated referrals and that, therefore, Mr. Goad's estimates involving counts of referrals were not valid, not representative of his universe, unreliable, and could not be used to draw any inferences.

2. Mr. Goad has now submitted a new report dated August 12, 2011 (Dkt. 636-9 and a declaration dated August 22, 2011 (Dkt. 636-1). Dr. Richard Thompson has also

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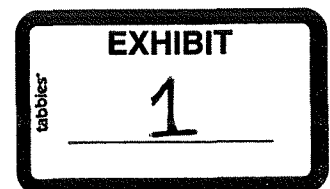
submitted a declaration dated August 22, 2011 (Dkt. 636-5). Mr. Goad admits that there were, in fact, 420 investigated referrals in his universe of investigated referrals. Mr. Goad declares that his amended report and declarations correct this "typographical error". Dkt. 636-1, p. 7, ¶ 25.

The handwritten notes in Mr. Goad's considered materials, Goad 1604, Exhibit 1 hereto, using the 343 count in Mr. Goad's Table III-1 prove that this was not a mere typing error. If the 420 count had been used in Mr. Goad's and Dr. Thompson's calculations, then the typographical error could be corrected by simply replacing 343 with 420 throughout Mr. Goad's report. The large number of corrections and recalculations contained in Mr. Goad's new report, the lack of any explanation for substituting "343" for the correct value of "420", and the continuing failure to provide detailed calculations in support of his statistics all make the characterization of this error as a "typographical error" difficult to accept.

3. If a consistent formula is used, increasing the size of a finite population should always lead to increased confidence interval (CI) width when the sampling fraction (the sample size expressed as a proportion of the population size) exceeds about 5%[1]. Mr. Goad's sampling fraction of about 20%, *see* Dkt. 636-9, p.28, triggers what is termed a "Finite Population Correction" that reduces the width of confidence interval estimates as the sample size approaches the population size. The reasoning for this correction is straightforward: as the sample size becomes larger,

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[1] http://en.wikipedia.org/wiki/Margin_of_error visited 9/1/2011.

approaching the population size, the confidence intervals should narrow, all the way to the limit – when the sample is the entire population (aka a census), the proportion is known, and the confidence interval width is zero. In Mr. Goad's case, using the formula in the online calculator Dr. Thompson declares he used to calculate the new CIs (SSCalc), *see,* Dkt. 636-5, pp. 3-4, ¶¶ 20-21, the increase from 343 to 420 in the universe should have had no other effect, except to make all CIs 3% wider[2]. Mr. Goad mentioned asymmetric CIs in his deposition and declaration, *see, e.g.,* Dkt. 363-1, p. 6, ¶ 23, but Dr. Thompson says in his declaration that he used SSCalc. *See,* Dkt. 636-5, pp. 3-4, ¶¶ 20-21. SSCalc produces only symmetric CIs, and all of Mr. Goad's new CIs are of the ± variety and therefore symmetric. Mr. Goad does not mention any corrections to any of the "point-estimates" of his sample proportions, and his August, 2011 report does not show any changes to his sample point-estimates. The above reasoning leads me to employ two reality checks for Mr. Goad's new CIs: 1. is each CI 3% wider? and 2. did the midpoint of the CI stay the same?

4. I have attached a Microsoft Excel spreadsheet containing my detailed calculations as Appendix A. I identified 19 modified CIs in Mr. Goad's August, 2011 report. I will refer here to these CIs by page number in the reports whenever possible, but, since some pages contain multiple CIs, I will sometimes refer to them by the row numbers in my Appendix A spreadsheet. I believe that 12 of these 19 CIs were intended by

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[2] http://www.surveysystem.com/sscalc.htm visited 9/1/2011. The finite population correction (FPC) used in the JavaScript in this web page is: pf = (pop - ss) / (pop - 1). Changing the "pop" variable from 343 to 420 would cause a multiplicative change of: sqrt(((420-84)/(420-1)) / ((343-84)/(343-1))) = 1.03. All CIs, whether in terms of referrals or wards, should simply be 3% wider.

Mr. Goad to be unique (rows 1-5, 7-11, and 13-14). In rows 2 and 3, it appears that Mr. Goad made errors in copying text and calculations from other locations in his report, creating differences in text and calculations where I believe no differences were intended.

5. Reality Check #1: Is each CI 3% wider?

    Of 12 unique CIs, 6 are now wider (rows 1, 4, 7, 9, 10, 11) (3 are 3% wider), 3 are unchanged (rows 3, 5, 13), and 3 are narrower (rows 2, 8, 14). So 3 of 12 pass this reality check.

    The 9 of 12 CIs that did not widen by 3% are the result of either changes in the calculations, errors in the March, 2011 calculations, or errors in the August, 2011 calculations.

6. Reality Check #2: Did the midpoint of the CI stay the same?

    Of 12 unique CIs, 9 midpoints are unchanged (rows 1, 3, 5, 7, 9-11, 13, 14) , 2 CI midpoints shifted right (rows 2/17 & 4), and 1 midpoint shifted left (row 8). So 9 of 12 pass this reality check. Shifts of symmetric CI midpoints should only occur when the corresponding point-estimates from the sample change. Mr. Goad does not inform the reader of any such changes.

    I was unable to determine the point estimate for Mr. Goad's CI on row 4. In Mr. Goad's March, 2011 report, 9 out of 11 midpoints coincided with the point-estimates. In Mr. Goad's August, 2011 report, 10 out of 11 midpoints now coincide

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with the point-estimates. One midpoint does not coincide with the point estimate, and that error remains in the new report.

7. Following methods in Dr. Thompson's declaration using SSCalc, I am able to replicate Mr. Goad's results for 8 of 12 CIs within 1%. Mr. Goad's other 4 CIs are wider in his August, 2011 report than I calculate with the numbers from Mr. Goad's report using SSCalc.

Mr. Goad, in his reports and deposition, has been unable to tell us how his CIs were calculated. Now Dr. Thompson references SSCalc, but 4 of his 12 CIs do not appear to have been calculated from the numbers in Mr. Goad's report using SSCalc. Since SSCalc calculates only symmetric CIs, the asymmetric CIs that Mr. Goad continues to refer to in his deposition and his August, 2011 declaration remain another mystery.

8. In Dr. Thompson's August, 2011 declaration he states in part (p 4, item 20): "When I calculated the confidence intervals, however, the actual prevalence of each finding was known." I think what Dr. Thompson means to say is that the prevalence of each finding <u>in his sample</u> was known. If the prevalence of each finding in the population were known, there would be no need for confidence intervals. His findings from his samples can be used as estimates of the true proportions in the population but in a sampling framework they are still consider random variables. In Mr. Goad's report there was no a priori knowledge of the true population proportions, his sampling was done without replacement, and multiple samples will yield varying estimates

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(his population is heteroscedastic). These conditions dictate the conservative choice of a 50% point-estimate in the confidence interval calculation. In my opinion, Dr. Thompson's use of point-estimates from his sample in his confidence interval calculation is poor statistical practice.

9. Mr. Goad's August, 2011 Declaration, Dkt. 636-1, p. 6, ¶ 23, states in part: "I instructed Dr. Thompson to calculate confidence intervals for the findings I selected, using a 95% confidence level. Dr. Thompson provided me with the confidence interval range he calculated based on these instructions. In order to check the accuracy of Dr. Thompson's work, for each symmetric confidence interval, I applied the proportion found in the sample to the universe and verified that the resulting value fell at the midpoint of the applicable confidence interval range." (underlining added) Since Mr. Goad checked the midpoints of his CIs, I attempted to recalculate the three CIs in which the midpoints shifted in order to check Mr. Goad's work:

   a. In Mr. Goad's March, 2011 report at the top of page 39 Mr. Goad presents his findings with respect to whether children were adequately protected during investigations. (Dkt. 636-3, p.39) I consider this a very important issue in this case. Among his sample of 84 investigations, Mr. Goad found that in 84-13=71 investigations children were in need of protection. (Dkt. 636-3, p.39) Mr. Goad found that children in 24 investigations (24/71=33.8%) who needed protection were, or may have been, left in dangerous situations. (Dkt. 636-3, p.39) Mr. Goad applied his confidence interval of ±8.3% to "all OKDHS

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CPS investigations in which agency wards were alleged victims in 2009 and needed protective action" and found that "no fewer than 37 (13%) and in as many as 86 (30%) CPS investigations, children may not have been afforded adequate protection during the investigations." (Dkt. 636-3, p.39) It might be evident to the careful reader that <u>Mr. Goad's point-estimate of 33.8% is not only not at the center of his confidence interval from 13% to 30%, but Mr. Goad's point-estimate of 33.8% is *outside* his confidence interval</u>.

It is left to the reader to infer the number of investigations that needed protection in Mr. Goad's universe of 343 investigations. We can guess that Mr. Goad estimated that number at 343*71/84=290 investigations, and check that by calculating the limits 37/290=13% and 86/290=30%. (This estimate, of course, also has uncertainty associated with it, but that uncertainty was probably not accounted for in Mr. Goad's calculations.) Thus, Mr. Goad estimated 290 investigations needed protection, so the center of Mr. Goad's interval should have been at 33.8%*290=98 investigations. This estimate of 98 is outside Mr. Goad's interval when it should have been at the center of the interval shown on a number line in Figure 1 below:

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   37                86
   |------+-------|    o    March 2011 Report p 39, #17
                      98

0          50        100       150       200       250       300
        CPS Investigated Referrals Not Provided Adequate Protection
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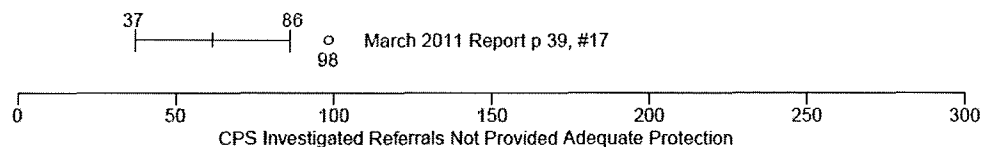
Figure 1: Goad March, 2011 Confidence Interval for Investigations Not
Provided Adequate Protection

In his August, 2011 report Mr. Goad took the opportunity to correct this

error without providing notice to the reader. (see Dkt. 636-9, p.39) Mr. Goad

now calculates a wider ±8.7% confidence interval (5% wider) and finds that

"... it can be determined that in no fewer than 84 (19.9%) and in as many as

156 (37.1%) CPS investigations, children may not have been afforded

adequate protection during the investigations." (Dkt. 636-9, p.39) Mr. Goad

might now estimate the number of investigations needing protection at

420*71/84=355, with an estimated center for his CI at 33.8%*355=120.

Note that Mr. Goad's new interval is centered at (84+156)/2=120, the

midpoint of his left and right limits, correcting another error in his March,

2011 report. However, Mr. Goad's percentages above, 19.9% and 37.1%, are

centered at (19.9+37.1)/2=28.5% when they should be centered at Mr.

Goad's point-estimate of 33.8%. Mr. Goad's calculated percentages in his

August, 2011 report are incorrect: 84/355=23.7%, not 19.9% and

156/355=44.0%, not 37.1%. With some errors corrected, and ignoring Mr.

Goad's errors in calculating percentages, Mr. Goad's new confidence interval

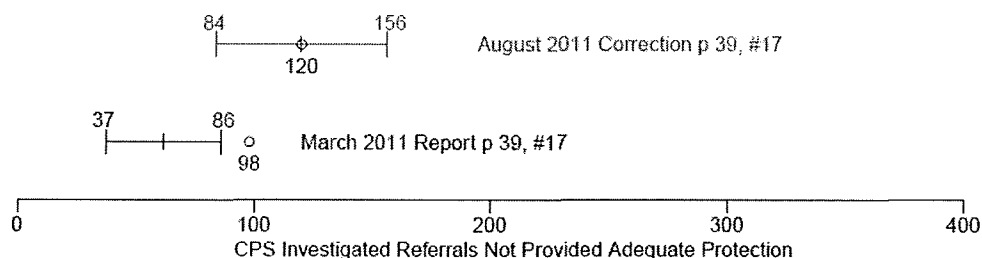can be presented consistent with his findings, as shown in Figure 2 below:

Figure 2: Goad March, 2011 and August, 2011 Confidence Interval for
Investigations Not Provided Adequate Protection

Mr. Goad probably intended to duplicate his result from page 39 to page vii, however his August, 2011 report incorrectly states on page vii: "Children were not afforded adequate protection during at least 45 (13%) and as many as 104 (30%) of the CPS investigations concerning OKDHS wards that the agency conducted in 2009, in which such protection was necessary." (Dkt. 636-9, p. vii) This statement conflicts with Mr. Goad's statement on page 39 of his August, 2011 report: "... in no fewer than 84 (19.9%) and in as many as 156 (37.1%) CPS investigations, children may not have been afforded adequate protection during the investigations." (Dkt. 636-9, p.39)

b. On page xii of his March, 2011 report Mr. Goad states in part: "All told, OKDHS' bad decision-making affected between 19.2% and 41.3% of the OKDHS wards who were the subjects of investigations or assessments in 2009 ...." On page xiii of his August, 2011 report Mr. Goad corrects this CI to [18.3%, 47.6%], shown graphically on a number line in Figure 3 below:
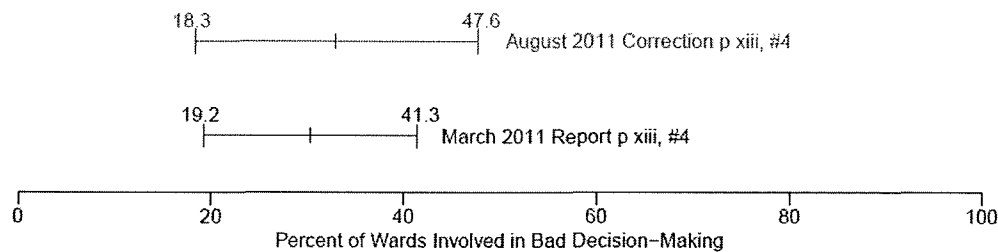
Figure 3: Goad March, 2011 and August, 2011 Confidence Interval for Percent of Wards Affected by Bad Decision-Making

The shift in the midpoint is evident. The midpoint of Mr. Goad's CIs shifted from (19.2+41.3)/2=30.3% in the March, 2011 report to (18.3+47.6)/2=33.0% in the August, 2011 report. I was unable to find counts or calculations supporting this finding, so I do not know what Mr. Goad's point-estimates of the proportions were, and I do not know if either of those midpoints matches Mr. Goad's point-estimate.

I did, however, follow the procedures Dr. Thompson outlines in his declaration to obtain a conservative CI estimate from the SSCalc website. I compared this CI width to Mr. Goad's CI width of 47.6-18.3=29.3%. Entering a 95% confidence level, a sample size of 158 investigated wards + 33 assessed wards = 191 wards, a population size of 790 investigated wards + 33 assessed wards = 823 wards, and an estimated proportion of (18.3+47.6)/2=33.0% (all of the most conservative assumptions, staying within Dr. Thompson's stated procedure), into http://www.surveysystem.com/sscalc.htm returns a confidence interval

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width of 5.85*2=<u>11.7%</u>. We do not know how Mr. Goad calculated these numbers, but Mr. Goad's confidence interval for this finding, 29.3%, is <u>more than twice as wide</u> as the 11.7% confidence interval returned by the online calculator Dr. Thompson declares that he used.

c.   On page 24 of his March, 2011 report Mr. Goad presents his statistics for prior investigations involving foster homes. Mr. Goad's point-estimate for the proportion of homes with prior substantiated investigations is (p 24): "In five (6.0%) of the 84 CPS investigations reviewed, the prior child abuse/neglect allegation(s) against these caregivers had been Substantiated. " He then finds (p 24) that "The confidence interval for this finding is ±5.9%. This means that at least five and as many as 45 <u>of the CPS investigations conducted in 2009</u> involved foster homes in which OKDHS knowingly placed children – children whom OKDHS removed from the care of their parents because they were unsafe – with foster caregivers who were abusive and/or neglectful." (underlining added) In August, 2011 Mr. Goad corrected this finding (p 24) to: "The confidence interval for this finding is ±4.5%. This means that at least 6 and as many as 44 of the CPS investigations conducted in 2009 involved foster homes in which OKDHS knowingly placed children – children whom OKDHS removed from the care of their parents because they were unsafe – with foster caregivers who were abusive and/or neglectful."

Mr. Goad does not explain how adding 77 children to his population cold

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have narrowed his confidence interval from ±5.9% to ±4.5%. Mainstream

statistical theory in use in the online calculator that Dr. Thompson declares

he used dictates that increasing the population from 343 to 420 should

widen all CIs by 3%. This is one of three CIs (pp 24, 39, and 41) that were

narrower in Mr. Goad's August, 2011 report than in his March, 2011 report.

Checking the March, 2011 calculation, Mr. Goad's point estimate is <u>6.0%</u>, but

the midpoint of Mr. Goad's interval is (5+45)/2=25 and 25/343=<u>7.3%</u>. Using

the proportions in Mr. Goad's text, his CI of 6.0% ±5.9% on the population of

343 investigations yields a lower limit of 6.0%*343 – 5.9%*343 = 0.3 which

rounds to <u>zero investigations</u> and an upper limit of 6.0%*343 + 5.9%*343 =

41 investigations. The midpoint of that CI is (0+41)/2=20.5 and

20.5/343=6.0%, consistent with Mr. Goad's point-estimate. If Mr. Goad had

calculated using the point-estimate and CI half-width in his text, his

confidence interval would have included zero, and he would be <u>unable to</u>

<u>reject the null hypothesis</u> that his finding is different from zero children in

investigations placed with foster caregivers who were abusive and/or

neglectful. These confidence intervals are shown in Figure 4 below:
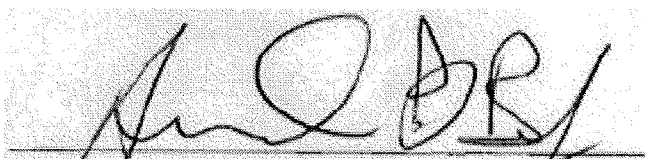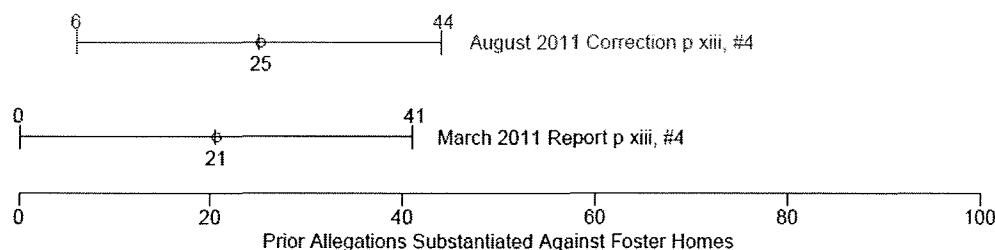
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Figure 4: Goad March, 2011 and August, 2011 Confidence Interval for Foster Homes with Prior Substantiated Investigations

10. Conclusions: In his August, 2011 report, Mr. Goad goes beyond correcting a typographical error, injecting some new errors, and correcting some additional errors from his March, 2011 report without informing the reader of the changes or his earlier errors. Important details of their calculations that are necessary to check their work or determine the source of their errors are still not revealed by Mr. Goad and Dr. Thompson.

Dr. Thompson declares that he used the SSCalc online calculator for his new CIs, but CIs calculated by SSCalc using parameters from Mr. Goad's August, 2011 report do not match 4 of the 12 new CIs in Mr. Goad's report. The math used by SSCalc dictates that a correction of the population size from 343 to 420 units must yield an increase in the CI width of 3%. Nine of 12 of Mr. Goad's altered CIs are inconsistent with this math. Merely correcting the population size should only affect the width of Mr. Goad's CIs, yet the midpoints of 3 of 12 new CIs have shifted from their March, 2011 values.

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Mr. Goad's calculations are unreliable, and the reader is not provided enough information to check them. Mr. Goad's and Dr. Thompson's August, 2011 report and declarations serve to reinforce my June, 2011 opinion: Mr. Goad was not qualified to determine the sample size, determine the measures, oversee the calculations, or interpret the results in his study. Due to methodological errors, Mr. Goad failed to show that his opinion is significantly different from OK DHS, though, based on Mr. Goad's rhetoric, I still feel certain that it is.

Andrew B. Barclay
September 6, 2011

Appendix A

Calculation Details

Changes to Mr. Goad's Confidence Intervals

Row	Page	2011 03 15 Goad Review.pdf 343 investigations / 645 wards (est.)				2011 08 12 Final CORRECTED Goad Report redline.pdf				Increase in Width		Shift in Center	Point Estimate	surveysystem.com SSCalc CI				Wald width	Wald * FPC
		Left	Middle	Right	Width	Left	Middle	Right	Width	Delta	%			Np	Ns	95% level	Diff		
1	vii	18.6%	32.2%	45.8%	27.2%	18.3%	32.2%	46.1%	27.8%	0.6%	+2.2%	+0.0%	32.1%	420	84	17.9%	+9.9%	20.0%	17.9%
2	vii	20.6%	31.7%	42.8%	22.2%	21.5%	31.7%	41.8%	20.3%	-1.9%	-8.6%	-0.1%	31.6%	790	158	13.0%	+7.3%	14.5%	13.0%
3	vii	13.0%	21.5%	30.0%	17.0%	13.0%	21.5%	30.0%	17.0%	0.0%	+0.0%	+0.0%	28.6%	420	84	17.3%	-0.3%	19.3%	17.3%
4	xiii	19.2%	30.3%	41.3%	22.1%	18.3%	33.0%	47.6%	29.3%	7.2%	+32.6%	+2.7%	??	823	191	11.7%	+17.6%	13.3%	11.7%
5	20	4.9%	8.9%	12.9%	8.0%	4.9%	8.9%	12.9%	8.0%	0.0%	+0.0%	+0.0%	8.9%	790	158	7.9%	+0.1%	8.9%	7.9%
6	20	4.8%	8.8%	12.9%	8.1%	4.9%	8.9%	12.9%	8.0%	-0.1%	-1.1%	+0.1%	8.9%	790	158	7.9%	+0.0%	8.9%	7.9%
7	21	16.9%	25.0%	33.1%	16.2%	16.7%	25.0%	33.3%	16.6%	0.4%	+2.5%	+0.0%	25.0%	790	158	12.1%	+4.5%	13.5%	12.1%
8	24	1.5%	7.3%	13.1%	11.7%	1.4%	6.0%	10.5%	9.0%	-2.6%	-22.4%	-1.3%	6.0%	420	84	9.1%	-0.1%	10.1%	9.1%
9	26	14.2%	24.1%	34.0%	19.8%	13.9%	24.1%	34.3%	20.4%	0.6%	+3.0%	+0.0%	24.1%	270	54	20.4%	-0.0%	22.8%	20.4%
10	31	9.8%	16.7%	23.6%	13.8%	9.6%	16.7%	23.8%	14.2%	0.4%	+2.9%	+0.0%	16.7%	420	84	14.3%	-0.1%	15.9%	14.3%
11	31	8.8%	15.5%	22.2%	13.4%	8.6%	15.5%	22.4%	13.8%	0.4%	+3.0%	+0.0%	15.5%	420	84	13.9%	-0.1%	15.5%	13.9%
12	32	18.6%	32.2%	45.8%	27.2%	18.3%	32.2%	46.1%	27.8%	0.6%	+2.2%	+0.0%	32.1%	420	84	17.9%	+9.9%	20.0%	17.9%
13	33	10.9%	16.5%	22.1%	11.2%	10.9%	16.5%	22.1%	11.2%	0.0%	+0.4%	+0.0%	16.5%	790	158	10.4%	+0.9%	11.6%	10.3%
14	34	9.8%	15.2%	20.6%	10.8%	10.2%	15.2%	20.2%	10.0%	-0.8%	-7.4%	+0.0%	15.2%	790	158	10.0%	-0.0%	11.2%	10.0%
15	34	9.8%	15.2%	20.6%	10.9%	10.3%	15.3%	20.3%	10.0%	-0.9%	-7.9%	+0.1%	15.2%	790	158	10.0%	-0.0%	11.2%	10.0%
16	34	20.6%	31.7%	42.8%	22.2%	21.5%	31.7%	41.9%	20.4%	-1.8%	-8.1%	+0.0%	31.6%	790	158	13.0%	+7.4%	14.5%	13.0%
17	39	13.0%	21.5%	30.0%	17.0%	19.9%	28.5%	37.1%	17.2%	0.2%	+1.2%	+7.0%	33.8%	355	71	17.3%	-0.1%	22.0%	19.7%
18	41	20.6%	31.7%	42.8%	22.2%	21.5%	31.7%	41.8%	20.3%	-1.9%	-8.6%	-0.1%	31.6%	790	158	13.0%	+7.3%	14.5%	13.0%
19	41	18.6%	32.2%	45.8%	27.2%	18.3%	32.2%	46.1%	27.8%	0.6%	+2.2%	+0.0%	32.1%	420	84	17.9%	+9.9%	20.0%	17.9%

Should be 331/790=41.9%, correct on p 34, incorrect on pp vii & 41.

Must match p 39, but does not. Looks like p 39 is correct, p vii is not.

Light blue are duplicated findings

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	SAMA	JNW
CAS:	84 INV	343 INV
	158 K	645 K (@)
OCA	41 INV	212 INV
	20 K	374 K (@)
SO	93 SO	464 SO
	162 K	802 K (@)

BODY CHECKS

$=$ 54 (or 158 or 34.17%)

NO BODY CHECKS

$\rightarrow$ 34.17% of 643 = 220

so 220 = UNIV OF ND

$\rightarrow$ 13 of 54 in SMALL COT

BODY CHECKS (24.1%)

$-$ "MOPT = 13.1

$\checkmark$ CI = 9.9% so $\pm$ 21.8

RANGE = $\boxed{31.2 - 74.68}$

R$\overline{T}$'s WB

31.2 — 74.8

SWONZERE

J 15,908
K 24897

WHITECROW
2046
11 96
1942

AUSTIN DSV60
3000

RYAN WEEKS
1950

LAMAR
2187
290

DUSTIN STEWART
1411

RAY GARNER
3700

NAOMI WHITECROW
3639

STEPHEN WOOD
4500

DAELIN MCFARLAND
1800

DALE DAVIS
5300

1800